

DEPARTMENT OF ENERGY  
FY 1998 CONGRESSIONAL BUDGET REQUEST  
OTHER DEFENSE ACTIVITIES  
(Tabular dollars in thousands, Narrative in whole dollars)

OFFICE OF NUCLEAR ENERGY, SCIENCE AND TECHNOLOGY  
NUCLEAR TECHNOLOGY R&D

PROGRAM MISSION

The Nuclear Technology R&D program supports research and development on technologies that help DOE achieve high-priority missions, specifically electrometallurgical treatment of DOE spent fuels for safe storage and ultimate disposition in an approved geological repository. There are over 100 different spent fuel types in the DOE inventory. Many of these were part of the National Security programs. Congress funded their development under the Atomic Energy Defense Activities in FY 1996 as part of the Defense Environmental Restoration and Waste Management appropriation. The Department has decided to request funding for this effort in FY 1998 under Atomic Energy Defense Activities but as part of the Other Defense Activities appropriation.

The GOALS of the Nuclear Energy R&D program are to:

1. Develop advanced nuclear technologies to address high-priority challenges.
2. Reduce the amount of spent fuel currently in the DOE inventory, treat this fuel for safe storage and eventual disposition in a geological repository.

The OBJECTIVES related to these goals is:

1. Treat EBR-II spent fuel and blankets to assure that the electrometallurgical technology can be applied to other DOE spent fuels.

PERFORMANCE MEASURE:

1. Successfully complete the demonstration of the treatment of 100 EBR-II fuel assemblies and 25 blanket assemblies.

#### SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

1. Treatment of Metallic Spent Fuels -- Demonstrate prototype electrorefiner module with selected fuel elements and adapt design for EBR-II blanket assembly treatment.
2. Treatment of Oxide Spent Fuels -- Perform experiments and analyses evaluating electrometallurgical treatment of TMI-2 core debris with materials representative of three core regions.
3. Treatment of MSRE Fuel and Flush Salts -- Perform experiments and analyses evaluating electrometallurgical treatment of MSRE fuel salt using simulated fuel salt composition.
4. Waste Treatment Processes -- Perform experiments and analyses evaluating electrolytic salt pretreatment.
5. Waste Form Production and Qualification -- Characterize performance of reference waste forms in accordance with established testing protocol.
6. Treatment of Aluminum-based Fuels -- Complete feasibility experiments with unirradiated aluminum matrix fuel materials to provide basis for technology selection by DOE.

NUCLEAR TECHNOLOGY R&D

PROGRAM FUNDING PROFILE  
(Dollars in Thousands)

<u>Sub-program</u>	FY 1996 Current <u>Appropriation</u>	FY 1997 Original <u>Appropriation</u>	FY 1997 <u>Adjustments</u>	FY 1997 Current <u>Appropriation</u>	FY 1998 <u>Request</u>
Nuclear Technology R&D	<u>\$25,000</u> <sup>1</sup>	<u>\$20,000</u> <sup>1</sup>	<u>\$0</u>	<u>\$20,000</u> <sup>1</sup>	<u>\$25,000</u>
<b>TOTAL, Nuclear Technology R&amp;D</b>	<b><u>\$25,000</u><sup>1</sup></b>	<b><u>\$20,000</u><sup>1</sup></b>	<b><u>\$0</u></b>	<b><u>\$20,000</u><sup>1</sup></b>	<b><u>\$25,000</u></b>

NUCLEAR TECHNOLOGY R&D

PROGRAM FUNDING BY SITE  
(Dollars in Thousands)

<u>Laboratory/Plant/Installation</u>	FY 1996 Current <u>Appropriation</u>	FY 1997 Original <u>Appropriation</u>	FY 1997 <u>Adjustments</u>	FY 1997 Current <u>Appropriation</u>	FY 1998 Budget <u>Request</u>
Chicago Operations Office					
Argonne National Laboratory - East	\$25,000 <sup>1</sup>	\$19,500 <sup>1</sup>	\$0	\$19,500 <sup>1</sup>	\$25,000
All Other Sites	<u>\$0</u>	<u>\$500<sup>1</sup></u>	<u>\$0</u>	<u>\$500<sup>1</sup></u>	<u>\$0</u>
<b>TOTAL</b>	<b><u>\$25,000<sup>1</sup></u></b>	<b><u>\$20,000<sup>1</sup></u></b>	<b><u>\$0</u></b>	<b><u>\$20,000<sup>1</sup></u></b>	<b><u>\$25,000</u></b>

## OTHER DEFENSE ACTIVITIES

### NUCLEAR TECHNOLOGY R&D (Dollars in Thousands)

#### I. Mission Supporting Goals and Objectives

The Nuclear Technology R&D program supports research and development on technologies to help DOE achieve high-priority missions, specifically electrometallurgical treatment of DOE spent fuels for safe storage and ultimate disposition.

DOE is responsible for approximately 2,700 metric tons of spent nuclear fuel discharged from DOE reactors and in storage at several DOE sites. A standard, cost-effective means for treating this spent fuel for ultimate disposal is needed, and the electrometallurgical treatment process being developed at Argonne National Laboratory (ANL), which allows treatment of various fuels by one common method, appears to best meet these requirements. This process produces two common high-level waste forms and offers significant cost savings in commonality of process equipment and waste forms. The process has the potential to treat up to 90 percent of DOE's spent nuclear fuel inventory.

The Nuclear Technology R&D program supports the following significant activities:

- Continued electrometallurgical R&D for treatment of Experimental Breeder Reactor II (EBR-II) fuel and other DOE spent fuel types. Complete small-scale experiments (150kg).
- Plan waste treatment R&D and waste form qualification to support selection of the preferred waste forms for treated spent DOE fuels.
- Demonstrate prototype electrorefiner module with selected fuel elements and adapt design for EBR-II blanket assembly treatment.
- Perform experiments and analyses evaluating electrometallurgical treatment of TMI-2 core debris with materials representative of three core regions.
- Perform experiments and analyses evaluating electrometallurgical treatment of MSRE fuel salt using simulated fuel salt composition. Initiate conceptual design of equipment for installation at the Oak Ridge National Laboratory (ORNL).
- Perform experiments and analyses evaluating electrolytic salt treatment.
- Characterize performance of reference waste forms in accordance with established testing protocol.

The Nuclear Technology R&D program supports the following significant activities: -continued

- Complete feasibility experiments with unirradiated aluminum matrix fuel materials to provide basis for technology selection by DOE.
- Extend length of anodic dissolution baskets in high-throughput electrorefiner and demonstrate application to full-length fuel elements, completing the demonstration of metallic fuel electrometallurgical treatment.
- Demonstrate treatment of particulate oxide fuels with metallic matrices. Demonstrate multiple-batch reduction cycle.
- Complete design of electrometallurgical treatment equipment for installation at ORNL, and initiate full-scale demonstration with simulated fuel with prototypic equipment.
- Complete testing of zeolite column and ancillary equipment for fission product and transuranic element immobilization.
- Initiate preparation of high-level waste forms containing radioactive fission product elements and transuranic elements as a result of treatment of EBR-II driver fuel and blankets.
- Complete planning for a pilot scale demonstration using unirradiated aluminum matrix fuel.

II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$ Change</u>	<u>% Change</u>
Electrometallurgical Treatment of DOE Spent Fuels	<u>\$ 25,000<sup>1</sup></u>	<u>\$ 20,000<sup>1</sup></u>	<u>\$25,000</u>	<u>\$+5,000</u>	<u>+25</u>
<b>TOTAL, Nuclear Technology R&amp;D</b>	<b><u>\$ 25,000<sup>1</sup></u></b>	<b><u>\$ 20,000<sup>1</sup></u></b>	<b><u>\$ 25,000</u></b>	<b><u>\$ +5,000</u></b>	<b><u>+25</u></b>

---

1

Funded under Defense Environmental Restoration and Waste Management appropriation in FY 1996 and Energy Supply, Research and Development appropriation in FY 1997.

**III Performance Summary - Major Accomplishments:****FY 1996**      **FY 1997**      **FY 1998****Electrometallurgical Treatment of DOE Spent Fuels**

• Demonstrate prototype module with selected fuel elements and adapt design for EBR-II blanket assembly treatment	\$5,000	\$4,000	\$4,500
• Perform experiments and analyses evaluating electrometallurgical treatment of TMI-2 core debris with materials representative of three core regions.	\$5,700	\$5,500	\$6,000
• Perform experiments and analyses evaluating electrometallurgical treatment of MSRE fuel salt using simulated fuel salt composition.	\$2,800	\$0	\$500
• Perform experiments and analyses evaluating electrolytic salt pretreatment.	\$4,500	\$0	\$500
• Characterize performance of reference waste forms in accordance with established testing protocol.	\$7,000	\$10,500	\$10,500
• Complete feasibility experiments with unirradiated aluminum matrix fuel materials to provide basis for technology selection by DOE	\$0	\$0	\$2,500
• Support university research and development of spent fuel treatment technologies.	\$0	\$0	\$500
Total Electrometallurgical Treatment of DOE Spent Fuels	\$25,000	\$20,000	\$25,000

**EXPLANATION OF FUNDING CHANGES FROM FY 1997 TO FY 1998:**

• Increased funding results from two significant developments: First, the need to ensure feasibility of electrometallurgical treatment in preparing aluminum matrix fuels for disposal; and, second, transition into more mature phases of process demonstration, particularly regarding TMI-2 core debris.	<u>+\$ 5,000</u>
Total Funding Changes, Nuclear Technology R&D	+\$5,000

DEPARTMENT OF ENERGY  
FY 1998 CONGRESSIONAL BUDGET REQUEST  
OTHER DEFENSE ACTIVITIES  
(Tabular dollars in thousands, Narrative in whole dollars)

INTERNATIONAL NUCLEAR SAFETY

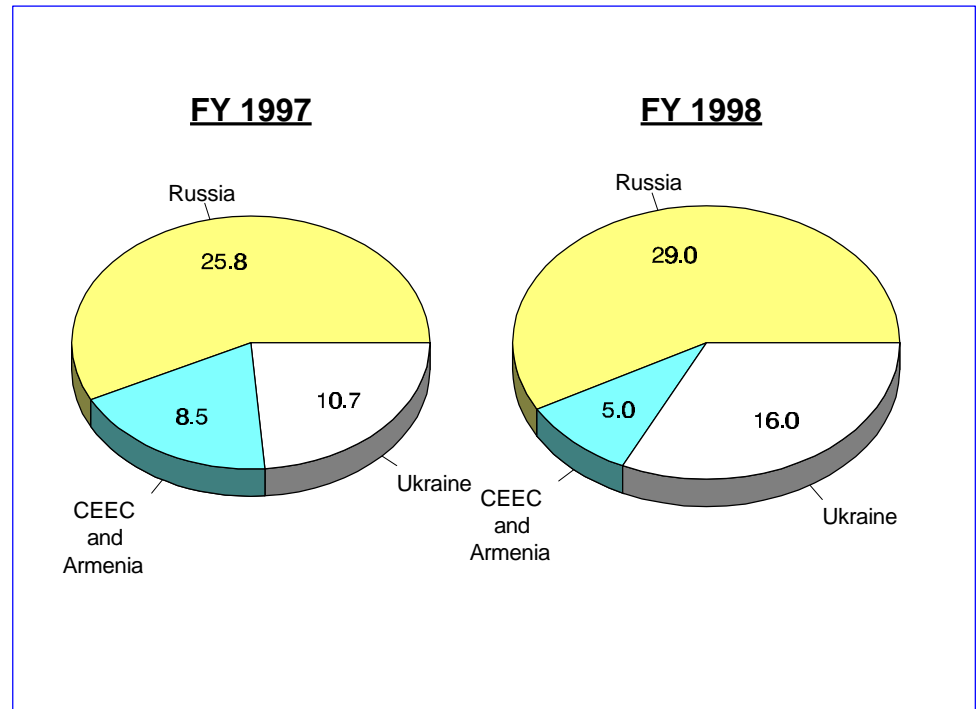
PROGRAM MISSION

The 1986 disaster at the Chornobyl nuclear power plant revealed, during a short, intense period, the many flaws in the Soviet approach to nuclear power and was one factor that led to the fall of the Soviet Union. The Soviet public, outraged by the apparent lack of concern for human health and environmental safety, the deception practiced by high-ranking officials, and the inability of the Soviet government to cope effectively with the aftermath, demanded change. A few short years later, the Soviet Union collapsed.

The reactors and nuclear infrastructures left behind by the Soviet government continue to operate in seven countries. Many of these reactors, including one that still operates at the Chornobyl site, suffer from deficiencies in training, safety procedures, and oversight--the same kinds of problems that allowed the Chornobyl accident to occur almost eleven years ago. Some problems have been exacerbated by the breakup of the Soviet Union--equipment shortages are commonplace and many nuclear professionals suffer from low or erratic pay. These conditions, if not corrected, could result in a new major nuclear accident in Ukraine, Russia, Armenia or in Central and Eastern Europe.

If another major nuclear accident occurred at one of the Soviet-designed reactors, the United States and the international community could be forced to deal with: a potentially massive humanitarian crisis requiring huge expenditures; the radioactive contamination of vital European allies (including those where U.S. military personnel are stationed) and friendly countries; the political and economic destabilization of a politically sensitive region of the world; and discrediting and weakening of democracy movements in the region in the same manner that the Chornobyl accident weakened the Soviet system. These potential

consequences led the Administration to conclude that enhancing the safety of Soviet-era nuclear reactors and establishing improved safety infrastructures in the countries that operate them is a vital national security interest of the United States. The U. S. and other Western countries have the technologies and skills to work with these nations to address nuclear safety challenges with a modest investment. Rather than providing billions of dollars in foreign aid, the approach we are taking is to set these countries on an independent path toward adequate nuclear safety. This is essential to preserve these emerging, democratic, free market economies.



*Funding by Country*

The International Nuclear Safety program is designed to reduce the national security and environmental threats posed by the operation of unsafe and aging nuclear facilities around the world. Particular attention is paid to improving the safety of Soviet-designed nuclear power plants. This program originated from U.S. commitments made at the 1992 G-7 Summit to help reduce the risks associated with the continued operation of Soviet-designed reactors and is conducted consistent with guidance and policies established by the U.S. Department of State, the Agency for International Development, and the Nuclear Regulatory Commission.

While serving a direct, national security need, the Department's International Nuclear Safety Program provides several indirect benefits to the United States: (1) the success of this program helps encourage Russia and other countries to continue cooperating in the control and accounting of nuclear weapons materials; (2) the program provides an entre to U.S. industry which could lead to significant business opportunities in the future; and (3) the program addresses nuclear safety issues which, if not dealt with, could further erode public confidence in nuclear energy in the United States--currently nuclear power plants provide more than 20 percent of U.S. electricity.

The GOALS of the International Nuclear Safety program are to:

1. Prevent another Chornobyl-type catastrophic accident.
2. Improve nuclear safety worldwide, particularly the safety of Soviet-designed nuclear power plants, without extending the operating life of these plants.
3. Develop and maintain core competencies in the area of nuclear safety.

The OBJECTIVES related to these goals are:

To enhance the safety of Soviet-designed nuclear power plants and help host countries upgrade their nuclear safety cultures and supporting infrastructures through:

- (1) installation of equipment and development of methods which will improve the safety of operations;
- (2) transfer technologies needed to reduce risk of reactor operations;
- (3) incorporate the owners and operators of Soviet-designed nuclear power plants as full partners in the global nuclear industry;
- (4) cultivate a more robust attitude towards nuclear safety;
- (5) enhance indigenous capabilities to evaluate safety and make decisions about shutdown; and
- (6) create opportunities for U.S. industries in the host countries.

## PERFORMANCE MEASURES:

### **Management and Operational Safety Improvements**

- Specific training and technology are being used by pilot plants and host country organizations in an average of four of the following operational safety areas: operational control procedures; normal operating procedures; abnormal operating procedures and emergency operating instructions; quality assurance and control program including corrective action tracking; event analysis and reporting including root cause analysis; configuration management program; self assessment program; and plant safety review board.
- Pilot plants are using the systematic approach to training to continue the development of the training courses for plant personnel, and some training courses have been completed.
- Simulators are being developed.
- Training on personnel qualification criteria is being provided to the regulator.
- Pilot plants have received some new maintenance equipment and training necessary to ensure safety related components function properly and have begun using this equipment and knowledge to establish an effective maintenance program.

### **Engineering and Technology Upgrades**

- A detailed fire hazards evaluation is completed at the Smolensk plant in Russia using the U.S. developed reactor core protection evaluation methodology.
- An additional Safety Parameter Display System (SPDS) is installed and operational at the Kursk, Smolensk, and Leningrad RBMK plants in Russia.
- An SPDS is installed and operational at the Novovoronezh VVER-440/230 plant in Russia.
- The first of 11 planned VVER-1000 SPDSs in Ukraine is installed and operational.
- Lithuania is producing improved trip modules for the Ignalina plant through a U.S. sponsored technology transfer program.
- An improved seismically resistant decay heat removal system is operational at the Armenian nuclear power plant.

### **Plant Safety Evaluations**

- In-depth safety analysis are underway at selected plants. Plant models and descriptions are being verified and finalized. Training programs in safety analysis methodology are completed. Plants have applied for regulatory approval of the safety analysis tools and methodologies.

### **Nuclear Safety Legislative and Regulatory Support**

- Training, workshops, and technology transfer on international regulatory procedures, nuclear indemnification laws, nuclear safety convention practices and standards, and regulation of large research reactors and fuel cycle facilities is 50% complete in host countries.

### **U.S. International Nuclear Safety Center at ANL and International Nuclear Safety Activities Support**

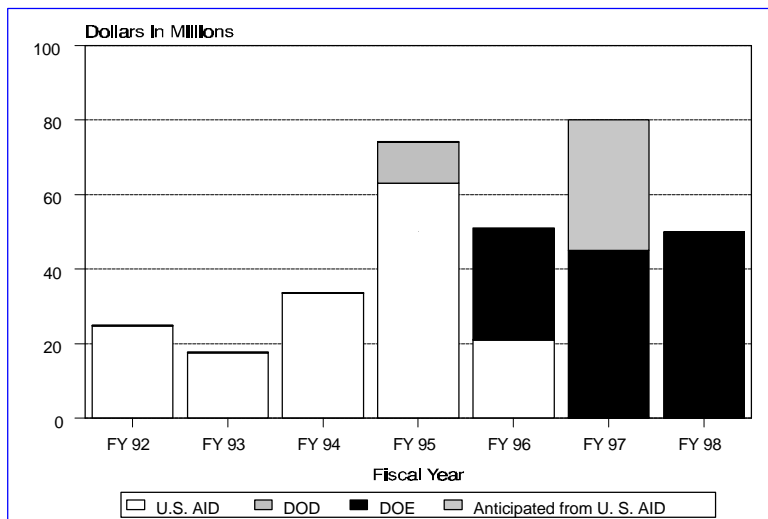
- The U.S. International Nuclear Safety Center at ANL is supporting the international exchange of nuclear safety information.
- The DOE representatives in Paris and Tokyo are supporting U.S. nuclear safety and nonproliferation goals.

#### SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- More than 150 individual projects have been initiated with the participation of 17 Soviet-designed plant sites and include the participation of 27 U.S. commercial companies to provide equipment, technical expertise, and services to improve safety.
- One-hundred eleven staff members from 13 nuclear reactor sites in Russia, Ukraine, and Central and Eastern European countries have worked with personnel at 11 U.S. nuclear power plants to observe, firsthand, practices and procedures for safe operation of U.S. reactors.
- The simulator models for Ukraine's Khmelnytsky plant were developed. A team of 22 Ukrainian specialists is participating in the development of the simulator; this experience will enable them to lead the development of simulators for the Rivne and South Ukraine plants.
- Two plant analyzers for Bulgaria's Kozloduy plant were provided. A plant analyzer was provided to the Lithuania for the Ignalina plant. The computers are assembled for the full-scope simulators at Russian's Kola and Kalinin plants.
- Nuclear training centers have been established at the Balakovo site in Russia and the Khmelnytsky plant in Ukraine. Training specialist from these centers are now training other Russian and Ukrainian nuclear plant personnel using a U.S. provided method that focuses on the knowledge and abilities required to perform essential tasks.
- Twenty-two of the planned 32 Emergency Operating Instructions (EOIs) have been implemented at the Novovoronezh VVER-440/320 plant in Russia. Working groups are continuing to draft EOIs for the VVER-440/213, VVER-1000, and RBMK plant designs. These drafts are provided to all Soviet-designed plants.
- The methodology for developing symptom-based Emergency Operating Instructions was transferred to plant experts in Russia, Ukraine, Bulgaria and Lithuania. Further development was transferred to the World Association of Nuclear Operators.
- The confinement of the Kola plant was significantly improved through the installation of sealant materials, fast-closing isolation valves, and radiation monitors. Additionally, emergency power at the Kola plant was improved by the installation of five reliable DC batteries and switchgear.
- Ultrasonic test equipment and high temperature clothing (needed to inspect for leaks) was provided to the Kursk plant.
- A developmental RBMK Safety Parameter Display System (SPDS) was provided to Russia to complete the design of the first unit being installed at Kursk. Ten additional RBMK SPDSs are currently planned over the next three years.
- Fire safety equipment was provided to the Zaporizhzhya plant in Ukraine and the Smolensk and Leningrad plants in Russia. A methodology for conducting detailed fire hazards analysis at Soviet-designed plants based on U.S. experience was developed and Russia and Ukraine fire safety experts were trained in its use.
- A spent fuel dry storage system transporter and cask liners were provided to the Zaporizhzhya plant in Ukraine. Ukrainian nuclear regulators were also trained in spent fuel dry storage technology to support licensing.

# INTERNATIONAL NUCLEAR SAFETY PROGRAM FUNDING PROFILE

<u>Sub-program</u>	<u>FY 1996 Current Appropriation</u>	<u>FY 1997 Original Appropriation</u>	<u>FY 1997 Adjustments</u>	<u>FY 1997 Current Appropriation</u>	<u>FY 1998 Budget Request</u>
International Nuclear Safety Activities	\$50,030	\$43,500 <sup>1</sup>	\$ 0	\$ 43,500 <sup>1</sup>	\$ 50,000
Chornobyl Initiative	<u>\$29,000</u> <sup>2</sup>	<u>\$1,500</u> <sup>3</sup>	<u>\$0</u>	<u>\$1,500</u> <sup>3</sup>	<u>\$0</u> <sup>4</sup>
SUBTOTAL, International Nuclear Safety	\$79,030 <sup>5</sup>	\$45,000 <sup>1,3</sup>	\$ 0	\$ 45,000 <sup>1,3</sup>	\$50,000
Funds included in Nonproliferation, Verification R&D appropriation.	<u>\$-79,030</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
<b>TOTAL, International Nuclear Safety</b>	<b><u>\$0</u></b>	<b><u>\$45,000</u></b>	<b><u>\$0</u></b>	<b><u>\$45,000</u></b>	<b><u>\$50,000</u></b>



## International Nuclear Safety -- Funding History

(FY 1996 excludes \$29 million received from U.S. AID for Chornobyl Sarcophagus and D&D activities and the Chornobyl Center)

- 1 Excludes \$35 million for Ukraine anticipated from U.S. AID in FY 1997.
- 2 Includes \$27.0 million received from U.S. AID for Chornobyl Sarcophagus and Decontamination and Decommissioning activities and \$2 million for the International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology.
- 3 Excludes \$25.0 million anticipated from U.S. AID in FY 1997 for Chornobyl Sarcophagus and Decontamination and Decommissioning activities. Includes \$1.5 million for the International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology.
- 4 Excludes \$27 million anticipated from U.S. AID in FY 1998 for Chornobyl Sarcophagus and Decontamination and Decommissioning activities. If transferred, funds will be received in the Chornobyl Initiative decision unit for these activities in FY 1998. FY 1998 funding in the amount of \$2 million is requested under the Chornobyl Initiative decision unit for the International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology.
- 5 Includes a total of \$49.03 million received from U.S. AID; excludes \$1.0 million of unobligated carryover from U.S. AID.

INTERNATIONAL NUCLEAR SAFETY  
PROGRAM FUNDING BY SITE

<u>Sub-program</u>	FY 1996 Enacted <u>Appropriation</u>	FY 1997 Original <u>Appropriation</u>	FY 1997 <u>Adjustments</u>	FY 1997 Current <u>Appropriation</u>	FY 1998 Budget <u>Request</u>
<b><u>International Nuclear Safety Activities</u></b>					
Richland Operations Office	\$0	\$0	\$0	\$0	\$0
Pacific Northwest National Laboratory	47,380	38,000	0	38,000	49,500
Chicago Operations Office	0	0	0	0	0
Argonne National Laboratory	1,600	4,000	0	4,000	0
All Other Sites	<u>1,050</u>	<u>1,500</u>	<u>0</u>	<u>1,500</u>	<u>500</u>
<b>Subtotal , International Nuclear Safety Activities</b>	<b>\$50,030</b>	<b>\$43,500<sup>1</sup></b>	<b>\$0</b>	<b>\$43,500<sup>1</sup></b>	<b>\$50,000</b>
<b><u>Chornobyl Initiative</u></b>					
Richland Operations Office					
Pacific Northwest National Laboratory	<u>\$29,000</u>	<u>\$1,500</u>	<u>\$0</u>	<u>\$1,500</u>	<u>\$0</u>
<b>Subtotal, Chornobyl Initiative</b>	<b><u>\$29,000<sup>2</sup></u></b>	<b><u>\$1,500<sup>3</sup></u></b>	<b><u>\$0</u></b>	<b><u>\$1,500<sup>3</sup></u></b>	<b><u>\$0<sup>4</sup></u></b>
<b>Subtotal, International Nuclear Safety</b>	<b>\$79,030<sup>5</sup></b>	<b>\$45,000<sup>1,3</sup></b>	<b>\$0</b>	<b>\$45,000<sup>1,3</sup></b>	<b>\$50,000</b>
Funds included in Nonproliferation, Verification R&D Appropriation	<u>\$-79,030</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
<b>TOTAL, International Nuclear Safety</b>	<b><u>\$0</u></b>	<b><u>\$45,000<sup>1,3</sup></u></b>	<b><u>\$0</u></b>	<b><u>\$45,000<sup>1,3</sup></u></b>	<b><u>\$50,000</u></b>

---

<sup>1</sup> Excludes \$35 million for Ukraine anticipated from U.S. AID in FY 1997.

<sup>2</sup> Includes \$27.0 million received from U.S. AID for Chornobyl Sarcophagus and Decontamination and Decommissioning activities and \$2 million for the International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology.

<sup>3</sup> Excludes \$25.0 million anticipated from U.S. AID in FY 1997 for Chornobyl Sarcophagus and Decontamination and Decommissioning activities. Includes \$1.5 million for the International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology.

<sup>4</sup> Excludes \$27 million anticipated from U.S. AID in FY 1998 for Chornobyl Sarcophagus and Decontamination and Decommissioning activities. If transferred, funds will be received in the Chornobyl Initiative decision unit for these activities in FY 1998. FY 1998 funding in the amount of \$2 million is requested under the Chornobyl Initiative decision unit for the International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology.

<sup>5</sup> Includes \$49.03 million received from U.S. AID; excludes \$1.0 million of unobligated carryover from U.S. AID.

## INTERNATIONAL NUCLEAR SAFETY

### I. Mission Supporting Goals and Objectives

This activity has five elements that are critical to achieving lasting improvements in nuclear safety culture and infrastructure development. First, the program is working to improve the capabilities of nuclear power plant operators to establish sound operational procedures, and to develop methods for responding to operational abnormalities. Second, the program seeks to improve the physical condition of the plants, particularly their safety systems. Third, the program provides professionals involved in the design, operation, and regulation of nuclear power plants with the techniques and expertise required to conduct safety analyses that are consistent with Western practices. The fourth element is assistance to host countries in developing the domestic liability legislation needed to enable a broader involvement of U.S. private industry and establish a strong, independent regulatory authority. The fifth element is directed at the safety of spent nuclear fuel and the transfer of spent fuel storage technology.

### II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$ Change</u>	<u>% Change</u>
Management & Operational Safety Improvements	\$14,860	\$11,900	\$17,500	\$ +5,600	+47
Engineering & Technology Upgrades	22,040	10,300	16,500	+6,200	+60
Plant Safety Evaluations	4,300	9,500	7,000	-2,500	-26
Nuclear Safety Legislative & Regulatory Support	330	1,350	2,000	+650	+48
Fuel Cycle Safety	300	0	0	0	0
Program Management	6,600	6,150	5,000	-1,150	-18
U.S. International Nuclear Safety Center at ANL	1,600	4,000	1,000	-3,000	-75
International Nuclear Safety Activities Support	<u>0</u>	<u>300</u>	<u>1,000</u>	<u>+700</u>	<u>+233</u>
Subtotal, International Nuclear Safety Activities	<b><u>\$50,030</u></b>	<b><u>\$43,500<sup>1</sup></u></b>	<b><u>\$50,000</u></b>	<b><u>\$6,500</u></b>	<b><u>+15</u></b>
Chornobyl Initiative	29,000 <sup>2</sup>	1,500 <sup>3</sup>	0 <sup>4</sup>	-1,500	-100
Subtotal, International Nuclear Safety	<b><u>79,030<sup>5</sup></u></b>	<b><u>45,000</u></b>	<b><u>50,000</u></b>	<b><u>5,000</u></b>	<b><u>+11</u></b>
Funds included in Nonproliferation, Verification R&D Appropriation	<b><u>-79,030</u></b>	<b><u>0</u></b>	<b><u>0</u></b>	<b><u>0</u></b>	<b><u>0</u></b>
TOTAL, International Nuclear Safety	<b><u>\$0</u></b>	<b><u>\$45,000<sup>1,3</sup></u></b>	<b><u>\$50,000</u></b>	<b><u>\$+5,000</u></b>	<b><u>+11</u></b>

---

<sup>1</sup> Excludes \$35 million for Ukraine anticipated from U.S. AID in FY 1997.

<sup>2</sup> Includes \$27.0 million received from U.S. AID for Chornobyl Sarcophagus and Decontamination and Decommissioning activities and \$2 million for the International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology.

<sup>3</sup> Excludes \$25.0 million anticipated from U.S. AID in FY 1997 for Chornobyl Sarcophagus and Decontamination and Decommissioning activities. Includes \$1.5 million for the International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology.

<sup>4</sup> Excludes \$27 million anticipated from U.S. AID in FY 1998 for Chornobyl Sarcophagus and Decontamination and Decommissioning activities. If transferred, funds will be received in the Chornobyl Initiative decision unit for these activities in FY 1998. FY 1998 funding in the amount of \$2 million is requested under the Chornobyl Initiative decision unit for the International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology.

<sup>5</sup> Includes \$49.03 million received from U.S. AID; excludes \$1.0 million in unobligated carryover from U.S. AID.

### **III. Performance Summary - Major Accomplishments:**

*(Note: Funding amounts shown in FY96 included in the Nonproliferation Verification R&D Appropriation)*

**FY 1996**      **FY 1997**      **FY 1998**

#### **Management and Operational Safety Improvements**

• Twenty-two of the planned 32 Emergency Operating Instructions (EOIs) were implemented at the Novovoronezh VVER-440/320 plant in Russia. Improve management and operational safety practices and procedures. Complete the drafting of Emergency Operating Instructions (EOIs) for all Soviet-designed reactor types and transfer further development to the World Association of Nuclear Operators (WANO).	\$2,000	\$600	
• Pilot training courses at the training centers in Russia and Ukraine were completed. Transfer the pilot training courses and training methodology from the training centers to other Soviet-design nuclear plant sites.	\$4,100	\$3,000	\$3,500
• One-hundred eleven staff members from 13 nuclear reactor sites in Russia, Ukraine, and Central and Eastern European countries worked with personnel at 11 U.S. nuclear power plants to observe, firsthand, practices and procedures for safe operation of U.S. nuclear power plants.	\$660		
• The simulator models for Ukraine's Khmelnytsky plant were developed. A team of 22 Ukrainian specialists is participating in the development of the simulator. Two plant analyzers for Bulgaria's Kozloduy plant were provided. A plant analyzer was provided to the Ignalina plant in Lithuania. The computers were assembled for the full-scope simulators at Russian's Kola and Kalinin plants. Complete full-scope simulators at the Kola and Kalinin plants in Russia. Complete simulators for the South Ukraine, Chornobyl, and Zaporizhzhya plants, and two simulators for the Rivne plant in Ukraine. Improve simulator training programs and upgrade simulators for the use of Safety Parameter Display Systems.	\$7,000	\$0 <sup>1</sup>	\$2,500
• Complete analytical simulators at the Bilibino and Novovoronezh plants in Russia. Upgrade the Balakovo full scope simulator in Russia. Upgrade the Trvana training center simulator in Slovakia.		\$4,500	
• Complete the implementation of a configuration management system in Lithuania and begin implementation in Russia and Ukraine.	\$500	\$500	\$4,000
• Complete the implementation of a quality assurance program in Ukraine and Non-destructive examination program in Russia and Ukraine.	\$600	\$1,500	\$4,000
• Transfer safety related maintenance technology to plants in Russia, Ukraine, and Lithuania, and provide maintenance center support to Hungary.			\$1,000
• Continue the implementation of a reliability database system in Russia and Ukraine.		\$1,000	\$1,500
• Continue the improvement of event analysis and lessons learned at all Soviet-designed plants.		\$500	\$1,000
• Complete a decommissioning study of the Lenigrad plant in Russia.		\$300	
Total Management and Operational Safety Improvements	\$14,860	\$11,900	\$17,500

### III. Performance Summary - Major Accomplishments (continued):

(Note: Funding amounts shown in FY96 included in the Nonproliferation Verification R&D Appropriation)

**FY 1996**

**FY 1997**

**FY 1998**

#### Engineering and Technology Upgrades

• The confinement of the Kola plant was significantly improved through the installation of sealant materials and fast-closing isolation valves. Additionally, emergency power at the Kola plant was improved by the installation of five reliable DC batteries and switchgear. Ultrasonic test equipment and high temperature clothing (needed to inspect for leaks) was provided to the Kursk plant. A developmental RBMK Safety Parameter Display System (SPDS) was provided to Russia to complete the design of the first unit being installed at Kursk.	\$8,320		
• Complete safety system upgrades such as the implementation of Safety Parameter Display Systems at the Kursk, Leningrad, and Novovoronezh plants in Russia, and the Chornobyl plant in Ukraine. Transfer safety related equipment upgrade technology. Complete a seismically resistant decay heat removal system in Armenia. Complete the implementation of Instrumentation and Control system technology transfer in Russia, Ukraine, and Lithuania.	\$850	\$9,800 <sup>1</sup>	\$15,500
• Provide Safety Parameter Display Systems for VVER-1000 plants in Ukraine.	\$9,000	\$0 <sup>1</sup>	
• Basic fire safety equipment was provided to the Zaporizhzhya and Chornobyl plants in Ukraine, the Smolensk and Leningrad plants in Russia, and the Armenia nuclear power plant. Guidelines for conducting detailed fire hazards analysis at Soviet-designed plants based on U.S. experience were developed. Complete detailed fire hazards evaluations in Russia using the U.S. developed guidelines.	\$3,870	\$500	\$1,000
Total Engineering and Technology Upgrades	\$22,040	\$10,300	\$16,500

#### Plant Safety Evaluations

• Complete detailed safety analysis activities at the Leningrad, Kola, Novovoronezh, and Kursk plants.	\$3,800	\$3,500	\$2,000
• Complete detailed safety analysis activities at the South Ukraine, Khmelnytsky and Zaporizhzhya plants in Ukraine.		\$0 <sup>1</sup>	\$2,000
• Enhanced code and data base development in support of safety assessments.	\$500	\$6,000	\$3,000
Total Plant Safety Evaluations	\$4,300	\$9,500	\$7,000

**III. Performance Summary - Major Accomplishments (continued):**

*(Note: Funding amounts shown in FY96  
included in the Nonproliferation  
Verification R&D Appropriation)*

**FY 1996****FY 1997****FY 1998****Nuclear Safety Legislative and Regulatory Support**

- Continue to assist host countries in the development of independent nuclear regulators. \$330 \$1,350 \$2,000

**Fuel Cycle Safety**

- A spent fuel dry storage system transporter and cask liners were provided the Zaporizhzhya plant in Ukraine. Ukrainian nuclear regulators were also trained in spent fuel dry storage technology to support licensing. \$300

**Program Management**

- Continue to provide management support for International Nuclear Safety program. \$6,600 \$6,150<sup>1</sup> \$5,000

**U.S. International Nuclear Safety Center at ANL**

- The U.S. International Nuclear Safety Center at ANL was established and will continue to support international nuclear safety data exchanges. \$1,600 \$4,000 \$1,000

**International Nuclear Safety Activities Support**

- Support Department of Energy representative in Paris at the U.S. Mission to the Organization for Economic Cooperation and Development (OECD) and the U.S. Embassy in Tokyo to maintain constructive engagement in promoting nuclear safety and curbing nuclear proliferation. \$300 \$1,000

---

<sup>1</sup>

Additional Funding anticipated from U.S. AID in FY 1997 for this activity.

III. Performance Summary - Major Accomplishments (continued):	(Note: Funding amounts shown in FY96 included in the Nonproliferation Verification R&D Appropriation)	FY1996	FY1997	FY1998
<u>Chornobyl Initiative</u>				
• The International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology was established in Ukraine located in the city of Slavutych, near Chornobyl.		\$2,000 <sup>1</sup>	\$1,500	\$0 <sup>2</sup>
• Participate in the European Commission (EC) managed study, Chornobyl Unit 4 Short and Long Term Measures, to develop measures to stabilize and ultimately convert the deteriorating sarcophagus into an ecologically safe condition. Begin implementation of the short term measures identified in the study, including: 1) Dose Reduction -- develop dose management and airborne radioactivity monitoring systems and deliver shielding and remote handling equipment, 2) Nuclear Criticality Safety -- provide radiation monitoring equipment and analysis software, (3) Dust Suppression -- provide fixant and application system, 4) Industrial Safety Enhancements -- provide two-way radios, video camera surveillance system(s), low voltage lighting systems, temperature and humidity measuring devices, fall protection equipment and scaffolding and various power tools. Assist in the decommissioning of Chornobyl Units 1-3. The Department will assess in-plant deactivation, decontamination and decommissioning needs for the Chornobyl site, the requirements to complete on-site heat plant and strategies to deal with Unit-4 fuel containing material. Additional short and long term measures will be initiated once potential projects have been agreed to between the U.S. G-7, and Ukraine		\$27,000 <sup>3</sup>	\$0 <sup>4</sup>	\$0 <sup>5</sup>
Total Chornobyl Initiative		\$29,000	\$1,500	\$0
Total International Nuclear Safety		<u>\$79,030</u>	<u>\$45,000</u>	<u>\$50,000</u>

EXPLANATION OF FUNDING CHANGES FY 1997 TO FY 1998:

- The increase in funds for management and operational safety improvements is because of new projects in configuration management and quality assurance. +\$ 5,600
- The increase in funds for engineering and technology upgrades is to provide for additional Safety Parameter Display Systems at RBMK plants. +\$ 6,200
- The decrease in safety analysis is because of the completion of planned activities with prior year funds. -\$ 2,500
- The increase in nuclear safety legislative and regulatory support is because of an agreement has been signed with Ukraine similar to the one with Russia. +\$ 650

- 
- 1 Funding received from U.S. AID.
  - 2 Funding requested under Chornobyl Initiative decision unit.
  - 3 Funding received from U.S. AID for Chornobyl Sarcophagus and Decontamination and Decommissioning activities.
  - 4 Anticipate \$25 million from U.S. AID in FY 1997 for Chornobyl Sarcophagus and Decontamination and Decommissioning activities.
  - 5 Anticipate \$27 million from U.S. AID in FY 1998. Funds will be received in the Chornobyl Initiative decision unit for these activities.

EXPLANATION OF FUNDING CHANGES FY 1997 TO FY 1998: - continued

	- \$1,150
• The decrease in funds for program management reflects execution of larger contracts within safety activities.	
• The decrease in funds for the U.S. International Nuclear Safety Center at ANL is because of completing the center establishment and the FY 1998 funds represent annual operating costs.	- \$ 3,000
• The increase in International nuclear safety activities support is because of increased activities in the Tokyo and Paris Department of Energy representative offices which the Office of Nuclear Energy, Science and Technology is assuming from another DOE office.	+\$ 700
• The decrease in Chornobyl initiative is because funds are being requested under the Chornobyl Initiative decision unit beginning in FY 1998.	- \$ 1,500
Total Funding Change, International Nuclear Safety	<hr/> +\$ 5,000

DEPARTMENT OF ENERGY  
FY 1998 CONGRESSIONAL BUDGET REQUEST  
OTHER DEFENSE ACTIVITIES  
(Tabular dollars in thousands, Narrative in whole dollars)

NUCLEAR SECURITY

PROGRAM MISSION

The mission of the Nuclear Security program is to reduce the threats posed by reprocessing of spent fuel in Russia and other states of the Former Soviet Union (FSU) and to promote spent fuel management practices that minimize the risks of proliferation of weapons-usable nuclear materials. Additional program elements address expansion of cooperation on national security-related nuclear issues and the safety and nonproliferation concerns related to breeder reactors in the FSU.

The GOAL(S) of the Nuclear Security program are to:

1. Support U.S. non-proliferation policy.
2. Promote policies that reduce the need for reprocessing of nuclear fuel.
3. Address the safety and nonproliferation concerns related to breeder reactors in countries of the FSU.
4. Assist the transfer of U.S. nuclear safety and nonproliferation concepts and technology to other countries.



*Cask transporter moving dry cask storage unit.*

The OBJECTIVES related to these goals are:

1. Develop spent fuel management plans to reduce the need for reprocessing in countries of the FSU. Efforts include:
  - Developing an understanding of viable economic alternatives and facilitate Central European and FSU countries with Soviet-designed reactors in analyses of integrated fuel cycle management activities. These activities include considering technical and economic options to reprocessing, reducing proliferation vulnerability, and enhancing protection from nuclear terrorism.
  - Developing technical acceptance for dry storage.
  - Transferring Western dry storage fabrication technology identified as economically desirable to countries with Soviet-designed reactors.
  - Supporting host countries in evaluating the use of mixed oxide and highly enriched uranium fueled in VVER reactors to reduce proliferation risk.
2. Engage in cooperative programs to address safety needs at and promote the shutdown of Kazakhstan's BN-350 reactor.
3. Assist the transfer of U.S. nonproliferation and nuclear safety concepts and technology to other countries through collaborative projects and technical seminars and missions.

#### PERFORMANCE MEASURES:

Performance measures for the Nuclear Security program include:

1. Develop plans for spent nuclear fuel management in each Central European or FSU country that does not have one.
2. Complete dry storage of spent nuclear fuel at Zaporozhye Nuclear Power Plant.
3. Develop and implement detailed plan addressing technical and programmatic issues associated with security and safety implications of burning mixed oxide fuel in Soviet-designed reactors.
4. Under accepted schedule, implement nuclear safety upgrades at the Aqtan BN-350 breeder reactor in Kazakhstan..
5. Implement or participate in technical seminars and/or missions to foreign countries.

#### SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- In FY 1998, efforts will be initiated to:
  - Identify issues that apply to dry storage (e.g., acceptable maximum dry storage cladding temperatures for VVER-1000 fuel) and work with involved countries and the International Atomic Energy Agency to resolve these issues.
  - Perform a summary evaluation of the directions that Central European and FSU countries are taking with respect to spent nuclear fuel management.
  - Identify interim storage options that apply or might apply to various countries.
  - Encourage plutonium disposition by supporting the use of mixed oxide fuel in Russian VVER reactors.
- Initiate nuclear safety upgrades that complement nonproliferation activities at the BN-350 breeder reactor in Aqtau, Kazakhstan.
- Develop and implement nuclear workshop and other similar vehicles to highlight U.S. nuclear safety and nonproliferation technologies as part of the Departmental seminars on electric power technologies for central and eastern Europe, the former Soviet Union, and countries that have supported U.S. worldwide nonproliferation efforts.

# NUCLEAR SECURITY

## PROGRAM FUNDING PROFILE

<u>Sub-program</u>	FY 1996 Enacted <u>Appropriation</u>	FY 1997 Enacted <u>Appropriation</u>	FY 1997 <u>Adjustment</u>	FY 1997 Current <u>Appropriation</u>	FY 1998 Budget <u>Request</u>
Nuclear Security	<u>\$0</u>	<u>\$3,500</u>	<u>\$0</u>	<u>\$3,500</u>	<u>\$4,000</u>
<b>TOTAL</b>	<b><u>\$0</u></b>	<b><u>\$3,500</u></b>	<b><u>\$0</u></b>	<b><u>\$3,500</u></b>	<b><u>\$4,000</u></b>

NUCLEAR SECURITY

PROGRAM FUNDING BY SITE

<u>Sub-program</u>	FY 1996 Enacted <u>Appropriation</u>	FY 1997 Enacted <u>Appropriation</u>	FY 1997 <u>Adjustment</u>	FY 1997 Current <u>Appropriation</u>	FY 1998 Budget <u>Request</u>
Richland Operations Office	\$0	\$0	\$0	\$0	\$0
Pacific Northwest National Laboratory	\$0	\$3,500	\$0	\$3,500	\$2,850
Chicago Operations Office	\$0	\$0	\$0	\$0	\$0
Argonne National Laboratory	\$0	\$0	\$0	\$0	\$1,000
All other sites	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$150</u>
<b>TOTAL, Nuclear Security</b>	<b><u>\$0</u></b>	<b><u>\$3,500</u></b>	<b><u>\$0</u></b>	<b><u>\$3,500</u></b>	<b><u>\$4,000</u></b>

## NUCLEAR SECURITY

### I. Mission Supporting Goals and Objectives

The United States supports development of viable technical and economic alternatives to reprocessing spent nuclear fuel (SNF) for countries with Soviet-designed reactors and supports reductions of weapons-usable material stockpiles. This promotes the broader objective of reducing the risk of reactor-related nuclear materials proliferation and nuclear-based terrorism.

The U.S. is also leading an effort to address the safety and nonproliferation concerns associated with breeder reactors in the former Soviet Union. In FY 1996, the Department's International Nuclear Safety Center initiated cooperation with nuclear agencies in Kazakhstan on nuclear safety research and development. In FY 1997, the Center and Kazakhstan jointly developed and began to implement a collaborative effort. The Center and Kazakhstan will develop and begin safety upgrade projects to improve the safety of the BN-350 reactor in Aqtau in FY 1998. These projects are consistent with the Kazakstani goal of shutting that reactor down in 2003.

In addition, the Department deals with many matters in which nonproliferation and nuclear safety capabilities are combined to support important national security goals. This activity allows the U.S. to address, through cooperative activities, those combined nonproliferation and nuclear safety national security issues and assist those countries and organizations which support our worldwide nonproliferation efforts.

### II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$ Change</u>	<u>% Change</u>
Safety improvements necessary for the operation of converted Russian reactors	\$ 0 <sup>1</sup>	\$3,500	\$ 0	-\$3,500	-100
Address nonproliferation and nuclear safety related national security issues	0	0	150	150	100
Safety and Nonproliferation - Breeder Reactors	0	0	1,000	1,000	100
Spent Fuel Management	<u>0</u>	<u>0</u>	<u>2,850</u>	<u>\$2,850</u>	<u>100</u>
<b>TOTAL, Nuclear Security</b>	<b><u>\$ 0</u></b>	<b><u>\$ 3,500</u></b>	<b><u>\$4,000</u></b>	<b><u>\$500</u></b>	<b><u>14</u></b>

---

<sup>1</sup>

Activities funded by State Department Nonproliferation and Disarmament funds.

### III. Performance Summary - Major Accomplishments:

**FY 1996**      **FY 1997**      **FY 1998**

#### Safety improvements necessary for the operation of converted Russian Reactors

- Initiate engineering simulator work, provide non-destructive examination equipment and transfer maintenance technologies to Russian production reactors.

\$0<sup>2</sup>

\$3,500

#### Address Nonproliferation and Nuclear Safety Related National Security Issues

- Through cooperative ventures, address combined nonproliferation and nuclear safety issues while transferring nuclear safety concepts and technologies to Eastern Europe and Asia.

\$150

#### Safety and Nonproliferation - Breeder Reactor

- Implement nuclear reactor safety upgrades necessitated by nonproliferation activities at Aqtau BN-350 reactor in Kazakhstan.

\$1,000

#### Discourage reprocessing by improving spent fuel management practices at reactors in the Former Soviet Union

- Develop a plan for spent nuclear fuel and radioactive waste management for each Central European/FSU country.
- Support design to enhance transient responses and safety parameters while supporting and training regulatory analysts on use of appropriate neutronics codes to evaluate license applications and facilitate resolution of fuel cycle security and safety issues in fabrication, shipping, discharge, storage and disposal.
- Complete Zaporizhzhya Nuclear Power Plant dry storage cask technology transfer and extend dry storage technology transfer to other Ukrainian plants.

\$850

\$1,000

\$1,000

Total Spent Fuel Management

\$0

\$0

\$2,850

Total Nuclear Security

\$0

\$3,500

\$4,000

EXPLANATION OF FUNDING CHANGES FY 1997 TO FY1998:

• Decrease in funding is due to relying exclusively on Department of Defense Cooperative Threat Reduction funds for core conversion of Russian plutonium production reactors.	-\$3,500
• Increase in funding allows execution of agreement with Former Soviet Union countries on spent fuel disposition options to avoid reprocessing and thereby enhancing nonproliferation goals.	+\$2,850
• Increase in funding is due to need to complement nonproliferation-related activities at BN-350 reactor and support transfers of U.S. nuclear nonproliferation and safety-related technology.	+\$1,150
Total Funding Change, Nuclear Security	<hr/> +\$ 500

DEPARTMENT OF ENERGY  
FY 1998 CONGRESSIONAL BUDGET REQUEST  
OTHER DEFENSE ACTIVITIES  
(Tabular dollars in thousands, Narrative in whole dollars)

CHORNOBYL INITIATIVE

PROGRAM MISSION

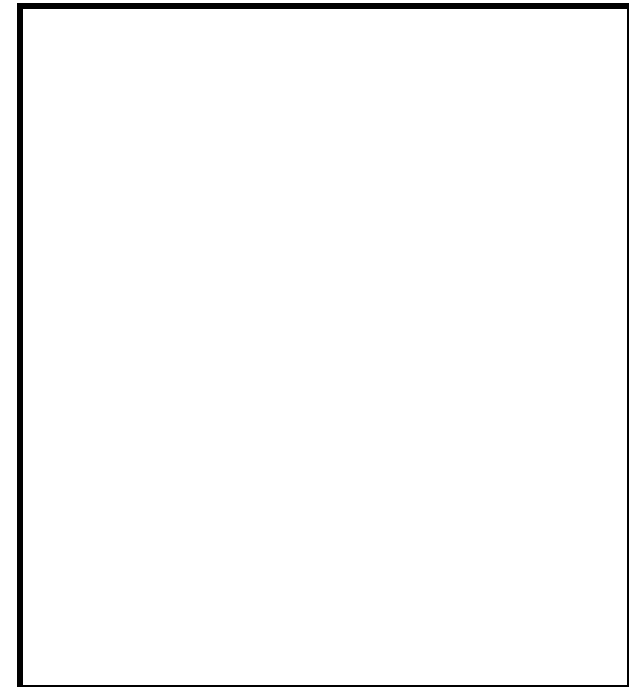
The Chernobyl Initiative program is designed to reduce the national security and environmental threats posed by the operation of the Chernobyl Nuclear Power Plant. This program is integrated with a G-7 effort aimed at ultimately securing the closure of the Chernobyl plant. It is conducted consistent with guidance and policies established by the U.S. Department of State, the Agency for International Development, and multinational organizations such as the European Union. Activities in this program are designed to: complete implementation of a quality assurance program, a safety-related maintenance program, fire safety improvements and a reliability data base; continue planning and implementation activities, in coordination with the G-7 and European Union, of short and long term measures associated with placing Unit-4 in an ecologically safe condition; and transfer, as appropriate, decontamination and decommissioning technology. Since Ukraine is highly dependent upon nuclear power, these activities would contribute significantly to assisting the Ukrainians in maintaining their economic independence in a difficult time of transition.

The GOALS of the Chernobyl Initiative are to:

1. Secure closure of the Chernobyl nuclear power plant.
2. In coordination with the G-7 and European Union, address the ultimate disposition of Chernobyl's Unit-4.
3. Foster development of the International Chernobyl Center for Nuclear Safety, Radioactive Waste and Radioecology in the city of Slavutych, near Chernobyl.

The OBJECTIVES related to these goals are:

1. Support development of a cost-effective, long-term solution to the remaining safety and environmental issues associated with Unit-4, with specific reference to the design and construction of a suitable encasement for the deteriorating sarcophagus and remediation of the remains of Unit-4.
2. Using the International Chernobyl Center for Nuclear Safety, Radioactive Waste and Radioecology to expand Ukrainian contacts with Western research and development institutions in the areas of decontamination and decommissioning, spent fuel and radioactive waste management; and develop comprehensive, sustainable programs for the evaluation and safe management of nuclear activities and facilities.



*Chernobyl Unit-4*

The OBJECTIVES related to these goals are: -continued

3. Support the Ukrainian/ G-7 action plan addressing the social impacts of closing the Chornobyl plant.
4. Address impacts of plant closure in the Chornobyl region in order to facilitate rapid shutdown.

#### PERFORMANCE MEASURES:

Performance measures for the Chornobyl Initiative include:

1. Complete database to assess spent fuel storage needs in Ukraine and identify preferred options for spent fuel management.
2. Develop plant operations, deactivation, decommissioning and decontamination, and radioactive waste management training capabilities.
3. Provide short term measures at the sarcophagus including dose reduction/management, radiation monitoring and dust suppression systems, shielding, remote handling and industrial safety equipment and assess in-plant deactivation, decontamination and decommissioning needs for the Chornobyl site and the requirements to complete the heat plant. Support investigation and implementation of strategies to deal with Unit-4 fuel containing material.

#### SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- The Chornobyl Initiative is not a new activity but is a new decision unit in FY 1998.
- The International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology was established in Slavutych, Ukraine forty miles northeast of Chornobyl.
- Initiated joint projects with the International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology on spent fuel management and enhanced nuclear data and computing capabilities.
- Establish Center training capabilities including classroom and radioactive waste and decontamination and decommissioning training facilities.
- Initiate technology demonstration projects related to mitigation of radiation hazards within the exclusion zone and sarcophagus including development of a technology demonstration facility.
- Develop a database containing information related to decontamination and decommissioning, radioactive waste management, environmental waste management, and sarcophagus work.

SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS: -continued

- Complete database to assess fuel storage needs in the Ukraine and identify preferred options for spent fuel management.
- Develop plant operations, deactivation, decontamination and decommissioning, and radioactive waste management training capabilities.

# CHORNOBYL INITIATIVE

## PROGRAM FUNDING PROFILE

<u>Sub-program</u>	FY 1996 Current <u>Appropriation</u>	FY 1997 Original <u>Appropriation</u>	FY 1997 <u>Adjustments</u>	FY 1997 Current <u>Appropriation</u>	FY 1998 Budget <u>Request</u>
Chornobyl Initiative	\$ 0 <sup>1</sup>	\$ 0 <sup>2</sup>	\$ 0	\$ 0	\$ 2,000 <sup>3</sup>
<b>TOTAL, Chornobyl Initiative</b>	<b><u>\$ 0</u></b>	<b><u>\$ 0</u></b>	<b><u>\$ 0</u></b>	<b><u>\$ 0</u></b>	<b><u>\$ 2,000</u></b>

---

<sup>1</sup> Excludes \$27 million received from U.S. AID for Chornobyl Sarcophagus and Decontamination and Decommissioning activities, and \$2 million for the International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology. These funds are included in the Nonproliferation Verification R&D appropriation in FY 1996.

<sup>2</sup> Excludes \$1.5 million for the International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology. These funds are included in the International Nuclear Safety account in FY 1997. Anticipate \$25.0 million from U.S. AID for Chornobyl Sarcophagus and Decontamination and Decommissioning activities in FY 1997.

<sup>3</sup> Anticipate \$27.0 million from U.S. AID for Chornobyl Sarcophagus and Decontamination and Decommissioning activities in FY 1998.

CHORNOBYL INITIATIVE  
PROGRAM FUNDING BY SITE

<u>Sub-program</u>	FY 1996 Current <u>Appropriation</u>	FY 1997 Original <u>Appropriation</u>	FY 1997 <u>Adjustment</u>	FY 1997 Current <u>Appropriation</u>	FY 1998 Budget <u>Request</u>
Richland Operations Office	\$0	\$0	\$0	\$0	\$0
Pacific Northwest National Laboratory	\$0	\$0	\$0	\$0	\$2,000
All other sites	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
<b>TOTAL, Chornobyl Initiative</b>	<b><u>\$0<sup>1</sup></u></b>	<b><u>\$0<sup>2</sup></u></b>	<b><u>\$0</u></b>	<b><u>\$0</u></b>	<b><u>\$2,000<sup>3</sup></u></b>

---

<sup>1</sup> Excludes \$27 million received from U.S. AID for Chornobyl Sarcophagus and Decontamination and Decommissioning activities, and \$2 million for the International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology. These funds are included in the Nonproliferation, Verification R&D appropriation in FY1996.

<sup>2</sup> Excludes \$1.5 million for the International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology. These funds are included in the International Nuclear Safety account in FY 1997. Anticipate \$25.0 million from U.S. AID for Chornobyl Sarcophagus and Decontamination and Decommissioning activities in FY 1997.

<sup>3</sup> Anticipate \$27.0 million from U.S. AID for Chornobyl Sarcophagus and Decontamination and Decommissioning activities in FY 1998.

## CHORNOBYL INITIATIVE

### I. Mission Supporting Goals and Objectives

The overriding concern of the Chornobyl Initiative is to reduce the national security threat posed by the continued operation of the Chornobyl Nuclear Power Plant by securing its closure. To improve the safe operation of the plant without extending its life, the Department is implementing safety upgrades at Chornobyl that include emergency operating instructions, management and operational controls, quality assurance, training, fire safety, safety parameter display system, and analytical simulator projects.

Ukraine is not likely to close the plant unless and until provision can be made for (1) electricity to replace that supplied by the plant, and (2) alleviation of the economic and social dislocation that will occur in the region as a result of closing the plant. Activities to address these issues include studies of social and economic impacts of plant closure. Through the International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology a variety of initiatives will be undertaken to lessen the impact of closure on plant personnel and the near by city of Slavutych.

Also of concern is the safe operation of the plant during the period before shutdown can occur and the long-term environmental safety in the region. These are addressed by the initiation of collaborative safety-related projects and the provision of U.S. technical expertise, and by cooperation with the European Union to provide a long-term solution to the remediation of Unit-4 and its deteriorating sarcophagus.

### II. Funding Schedule

<u>Program Activity</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>\$ Change</u>	<u>% Change</u>
Chornobyl Sarcophagus and Decontamination and Decommissioning Activities	\$ 0 <sup>1</sup>	\$0 <sup>2</sup>	\$ 0 <sup>3</sup>	+0	0
International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology	<u>\$ 0<sup>4</sup></u>	<u>\$0<sup>5</sup></u>	<u>\$ 2,000</u>	<u>+\$2,000</u>	<u>100</u>
<b>Total, Chornobyl Initiative</b>	<b><u>\$ 0<sup>1,4</sup></u></b>	<b><u>\$ 0<sup>2,5</sup></u></b>	<b><u>\$2,000<sup>3</sup></u></b>	<b><u>+\$2,000</u></b>	<b><u>100</u></b>

---

<sup>1</sup> Excludes \$27 million received from U.S. AID. Funds are included in the Nonproliferation Verification R&D appropriation in FY 1996.

<sup>2</sup> Anticipate \$25 million from U.S. AID in FY 1997.

<sup>3</sup> Anticipate \$27 million from U.S. AID in FY 1998.

<sup>4</sup> Excludes \$2 million received from U.S. AID. Funds are included in the International Nuclear Safety account in FY 1996.

<sup>5</sup> Excludes \$1.5 million included in the International Nuclear Safety account in FY 1997.

### III. Performance Summary - Major Accomplishments:

**FY 1996**

**FY 1997**

**FY 1998**

#### Chornobyl Sarcophagus and Decomtamination and Decommissioning Activities

- Participate in the European Commission (EC) managed study, Chornobyl Unit 4 Short and Long Term Measures, to develop measures to stabilize and ultimately convert the deteriorating sarcophagus into an ecologically safe condition. Begin implementation of the short term measures identified in the study, including: 1) Dose Reduction -- develop dose management and airborne radioactivity monitoring systems and deliver shielding and remote handling equipment, 2) Nuclear Criticality Safety -- provide radiation monitoring equipment and analysis software, (3) Dust Suppression -- provide fixant and application system, 4) Industrial Safety Enhancements -- provide two-way radios, video camera surveillance system(s), low voltage lighting systems, temperature and humidity measuring devices, fall protection equipment and scaffolding and various power tools. Assist in the decommissioning of Chornobyl Units 1-3. The Department will assess in-plant deactivation, decontamination and decommissioning needs for the Chornobyl site, the requirements to complete on-site heat plant and strategies to deal with Unit-4 fuel containing material. Additional short and long term measures will be initiated once potential projects have been agreed to between the U.S. G-7, and Ukraine.

#### International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology

- The International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology was established in Ukraine and located in the city of Slavutych, near Chornobyl.

---

<sup>1</sup> Excludes \$27 million received from U.S. AID. Funds are included in the Nonproliferation Verification R&D appropriation in FY 1996.

<sup>2</sup> Anticipate \$25 million from U.S. AID in FY 1997.

<sup>3</sup> Anticipate \$27 million from U.S. AID in FY 1998.

<sup>4</sup> Funds are included in the Nonproliferation Verification R&D appropriation in FY 1996.

### III. Performance Summary - Major Accomplishments - cont.

	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>
<u>International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology- cont.</u>		\$0 <sup>1</sup>	\$2,000
<ul style="list-style-type: none"> <li>Continue support of collaborative nuclear safety projects, including: development of advanced computing capabilities to acquire and evaluate basic nuclear data for use in safety and radiological assessments; assessment of in-plant deactivation, decontamination and decommissioning (D&amp;D) needs for the Chornobyl site; linking the International Chornobyl Center to the nuclear data and safety related databases in the U.S. and other countries; and further development and maintenance of a database describing nuclear safety projects in Ukraine. Additional work will be initiated to support investigations of strategies to deal with Unit-4 fuel containing material; establish Center training capabilities in the areas of plant operations, D&amp;D, and radioactive waste management training for plant personnel, including establishing classroom and radioactive waste and D&amp;D training facilities. The Department will also assist the Center in planning for and implementing Chornobyl D&amp;D and Unit-4 fuel disposition activities, preparing technology demonstration projects for mitigation of radiation hazards within the exclusion zone and sarcophagus, including development of a technology demonstration facility , and developing a database to institutionalize information related to D&amp;D, radioactive waste management, environmental management and sarcophagus work.</li> </ul>			
Total Chornobyl Initiative	\$0	\$0	\$2,000

#### EXPLANATION OF FUNDING CHANGES FY 1997 TO FY 1998:

- In FY 1996 and FY 1997, activities related to the International Chornobyl Center for Nuclear Safety, Radioactive Waste, and Radioecology were funded under International Nuclear Safety. Activities related to the disposition of Chornobyl's Unit 4 are funded by U.S. AID. \$2,000

---

<sup>1</sup> Funding provided under International Nuclear Safety.